Cycles of violence, and terrorist attacks index for the State of Oklahoma

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Abstract: I apply the Beveridge-Nelson business cycle decomposition method to the time series of per capita murder of Florida State (1933-2005). Separating out "permanent" from "cyclical" murder, I hypothesize that the cyclical part coincide with documented waves of organized crime, internal tensions, crime legislation, social, and political unrest, and with the periodic terrorist attacks to the U.S. The estimated cyclical component of murder shows that terrorist attacks against the U.S. have affected Oklahoma, creating estimated turning point dates marked by the most tragic terrorist attacks to the nation, and the State: the World Trade Center bombing in 1993, 9/11 2001, and the Alfred P. Murrah Federal Building bombing This paper belongs to the series of papers helping the U.S, and Homeland Security identify the closeness of terrorist attacks, and constructs the attacks index for Oklahoma. Other indices constructed include the Index for the U.S., New York State, New York City, Arizona, Massachusetts, California, Washington, Ohio, Philadelphia City, Arkansas, Missouri, Florida, and Michigan. These indices must be used as dependent variables in structural models for terrorist attacks and in models assessing the effects of terrorism over the U.S. economy.

Keywords: A model of cyclical terrorist murder in Colombia, 1950-2004. Forecasts 2005-2019; the econometrics of violence, terrorism, and scenarios for peace in Colombia from 1950 to 2019; scenarios for sustainable peace in Colombia by year 2019; decomposing violence: terrorist murder in the twentieth in the United States; using the Beveridge and Nelson decomposition of economic time series for pointing out the occurrence of terrorist attacks; terrorist murder, cycles of violence, and terrorist attacks in New York City during the last two centuries, and terrorist murder, cycles of violence, and attacks index for the City of Philadelphia during the last two centuries.

JEL classification codes: C22, D74, H56, N42, K14, K42, N42, O51.

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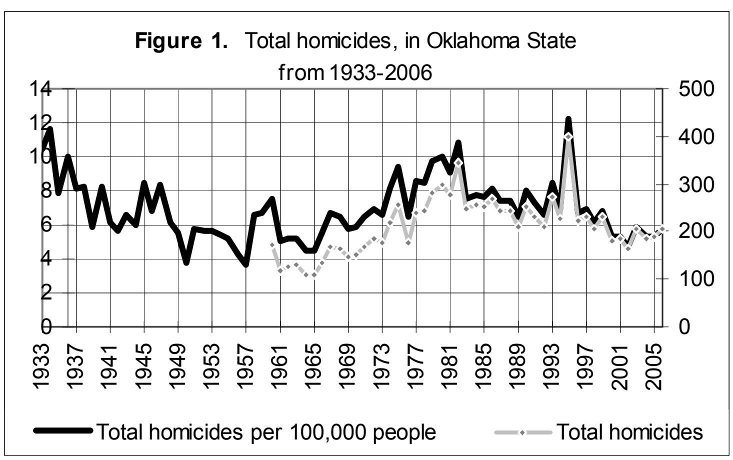
1. Introduction.

After decomposing violence, and creating the cyclical terrorist murder and attacks index for the United States (Gómez-Sorzano 2006), *terrorist murder, cycles of violence, and terrorist attacks in New York City during the last two centuries* (Gómez-Sorzano 2007A), and *terrorist murder, cycles of violence, and attacks index for the City of Philadelphia during the last two centuries* (Gómez-Sorzano 2007H) this paper continues that methodology research applied at the State level. The current exercise for Oklahoma State is the 10th one at decomposing violence at the state level on the purpose of constructing murder and attacks indices preventing the closeness of attacks or tragic events.

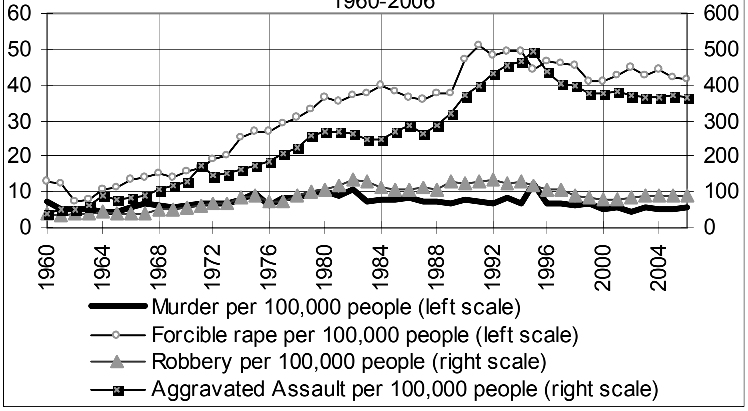
According to the Federal Bureau of Investigation, Uniform Crime Reporting System, total homicides in Oklahoma increased from an average of 138 per year in the 1960s to 210 in the 1970s, 265 in the 1980s, and 248 in the 1990s (Fig. 1), for year 2006 the State reported 207 homicides.

When adjusted for population growth, i.e., homicides per 100,000 people in the population, peaks are found in 1934, 1945, 1960, 1975, 1982, 1995, and 2006 with values of 11.6 murders per capita, and 8.4, 7.4, 9.4, 10.8,12.2 respectively for those years, and 5,78 for 2006.



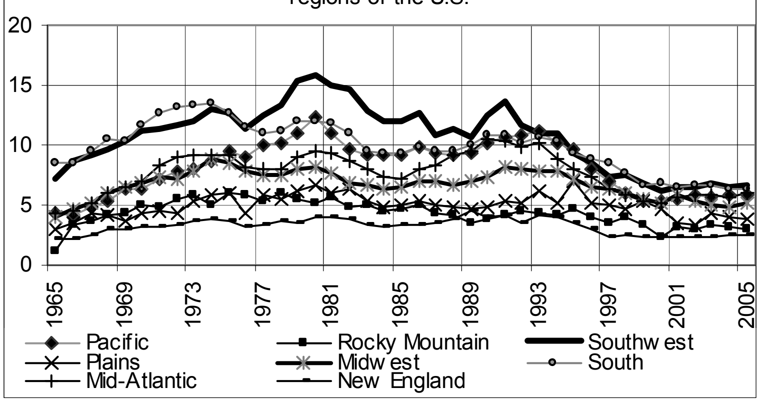
Out of the state's four categories of crimes, measuring violent crime (murder, forcible rape, robbery, and aggravated assault) murder is the one that varies the least, but shows a diminishing tendency from 2004 to 2005, buy jumping in 2006 (Fig. 2).

Figure 2. Categories of violent crime in Oklahoma State 1960-2006



Although the U.S., murder rates appear stabilizing during the last years, the highest per capita rates are found in the southwest and, south regions with 6.67 and 6.39 per capita, the Plains region where Oklahoma belongs appears as the sixth highest rate across the nation with 3.78 for 2005(Fig. 3).

Figure 3. Murder per capita rates per 100,000 across regions of the U.S.



2. Data and methods

The Bureau of Justice Statistics has a record of crime statistics that reaches back to 1933, (for this analysis I use the murder rates per 100,000 people[1]). As is known, time series can be broken into two constituent components, the permanent and transitory component. I apply the Beveridge-Nelson (BN for short 1981) decomposition technique to the Oklahoma State series of per capita murder.

[1] Taken from FBI, Uniform Crime Reports.

Beveridge and Nelson decomposition

I use the augmented Dickey Fuller (1981), tests to verify the existence of a unit root on the logarithm of murder 1933-2005. These tests present the structural form shown in equation (1).

$$\Delta L\,\mathrm{hom}_t = \alpha + \theta.\,t + \phi\, L\,\mathrm{hom}_{t-i} + \sum_{i=1}^{k} \gamma_i\, \Delta L\,\mathrm{hom}_{t-i} + \varepsilon_t \qquad (1)$$

The existence of a unit root, is given by (phi) ϕ=0. I use the methodology by Campbell and Perron (1991), in which an auto-regression process of order k is previously selected in order to capture possible seasonality of the series, and lags are eliminated sequentially if: a) after estimating a regression the last lag does not turn out to be significant, or b) if the residuals pass a white noise test at the 0.05 significance level. The results are reported on table 2.

Table 2 Dickey & Fuller test for Unit Roots

	K	Alpha	Theta	Phi	Stationary
D(Lokla) – per capita murder series	10	0.41	0.00093	-0.2445	No
Oklahoma State , 1933-2005		1.525	0.629	-1.5600	

Notes: 1. K is the chosen lag length. T-tests in second row, refer to the null hypothesis that a coefficient is equal to zero.

Under the null of non-stationarity, it is necessary to use the Dickey-Fuller critical value that at the 0.05 level, for the t-statistic is -3.50 , -3.45 (sample size of 50 and 100)

An additional test for unit roots uses equation (2) with the series ran in levels its results are reported on table 2A.

$$L\,\mathrm{hom}_t = \alpha + \theta.\,t + \phi\, L\,\mathrm{hom}_{t-i} + \sum_{i=1}^{k} \gamma_i\, L\,\mathrm{hom}_{t-i} + \varepsilon_t \qquad (2)$$

Table 2A Dickey & Fuller test for Unit Roots

	K	Alpha	Theta	Phi	Stationary
(Lhokla) – per capita murder series	11	0.41	0.00093	0.4900	No
Oklahoma State , 1933-2005		1.525	0.629	3.6730	

Notes: 1. K is the chosen lag length. T-tests in second row, refer to the null hypothesis that a coefficient is equal to zero.

Under the null of non-stationarity, it is necessary to use the Dickey-Fuller critical value that at the 0.05 level, for the t-statistic is -3.50 , -3.45 (sample size of 50 and 100)

After rejecting the null for a unit root (accepting the series is non stationary), I technically can perform the BN decomposition.

The selection of the right ARIMA model for Oklahoma was computationally intense, and I was able to find three models. The procedure begins by fitting the logarithm of the per capita murder series to an ARIMA model as shown on equation (2):

$$\Delta Lt\,\hom_t = \mu + \sum_{i=1}^{k} \gamma_i \Delta Lt\,\hom_{t-i} + \sum_{i=1}^{h} \psi_i \varepsilon_{t-i} + \varepsilon_t \qquad (2)$$

Where k, and h are respectively the autoregressive and moving average components. For Oklahoma, and using RATS 4, I estimated two initial ARIMA models (28,1,16) – model 1, and (7,1,18) – model 2, whose results are reported on table 3, and its transitory and permanent signals displayed on figure 4.

Table 3. Estimated ARIMA model for murder for Oklahoma State

Annual data from 1933 to 2005, **bold numbers for model 2**

Variables	Coeff	T-stats	Std Error	Signif
Constant	0.0100	4.9703	0.0020	0.0000
Constant	**-0.0213**	**-5.7739**	**0.0036**	**0.0000**
AR(1)	-0.3499	-5.6977	0.0614	0.0000
AR(3)	**-0.4232**	**-6.024**	**0.1048**	**0.0008**
AR(2)	-0.6696	-4.1236	0.1623	0.0000
AR(6)	-0.2631	-7.2035	0.0365	0.0000
AR(7)	**0.5366**	**8.002**	**0.0670**	**0.0000**
AR(28)	0.2264	3.238	0.0699	0.0026
MA(1)	1.2197	3.3668	0.3622	0.0019
MA(2)	**-0.9728**	**-5.0559**	**0.1924**	**0.0000**
MA(4)	**-0.5609**	**-4.2643**	**0.1315**	**0.0000**
MA(7)	**-0.9274**	**-4.6706**	**0.1985**	**0.0000**
MA(10)	-1.5430	-5.5621	0.2774	0.0000
MA(12)	-2.1654	-3.7675	0.5747	0.0006
MA(16)	-0.9008	-2.4227	0.3718	0.0200
MA(17)	**-0.5496**	**-3.673**	**0.1496**	**0.0005**
MA(18)	**-0.4126**	**-2.898**	**0.1424**	**0.0053**
MA(18)	-0.7314	-2.273	0.3218	0.0290

Centered R^2 = 0.8541, **0.7179**

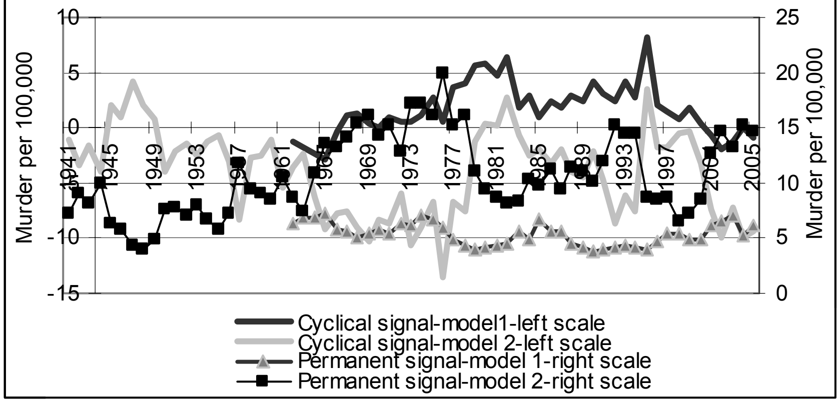
DW= 2.19, **2.000**

Significance level of Q = 0.0000 , **0.01549**

Usable observations = 44, **65**

Neither model 1, nor 2 reproduce to perfection major attacks to the country and the State; although their cyclical signals jump for the World Trade Center bombing, and the bombing of the Alfred P. Murrah building in Oklahoma in 1993, and 1995 respectively, they do not jump for 9/11 2001 (Fig. 4). Accordingly a perfect model is displayed on table 3A, and figure 5.

Figure 4. Permanent and cyclical signals of murder for Oklahoma State - models 1 and 2. 1940-2005



ARIMA model selected for Oklahoma State.

Table 3A. Selected ARIMA model for murder for Oklahoma State

Annual data from 1933 to 2005

Variables	Coeff	T-stats	Std Error	Signif
Constant	0.0073	2.3111	0.0031	0.0272
AR(1)	-0.3958	-4.7123	0.0840	0.0000
AR(2)	-0.6947	-8.006	0.0868	0.0000
AR(6)	-0.1645	-2.6802	0.0614	0.0114
AR(28)	0.1745	4.4125	0.0396	0.0001
MA(1)	1.2353	5.6244	0.2196	0.0000
MA(10)	-1.7952	-5.4775	0.3277	0.0000
MA(12)	-1.4667	-5.5219	0.2656	0.0000
MA(13)	1.2555	3.7847	0.3317	0.0006
MA(16)	-1.0591	-3.4452	0.3074	0.0015
MA(23)	-1.4310	-2.4433	0.5856	0.0200

Centered R^2 = 0.8770

DW= 2.30

Significance level of Q = 0.00023

Usable observations = 44

The 11 model parameters from table 3A or model 3 are replaced in the equation for the permanent component of murder shown in (3)[2]:

$$L\hom_t^{PC} = L\hom_0 + \frac{\mu . t}{1-\gamma_1 - \ldots \gamma_k} + \frac{1+\Psi_1 + \ldots . \Psi_h}{1-\gamma_1 - \ldots \gamma_k} \sum_{i=1}^{t} \varepsilon_i \qquad (3)$$

[2] The extraction of permanent and cyclical components from the original series is theoretically shown in BN (1981), Cuddington and Winters (1987), Miller (1998), Newbold (1990), and Cárdenas (1991). I show the mathematical details for the U.S.' case in appendix A. Eq.3 above, turns out to be Eq.17 in appendix A.

The transitory, terrorist murder estimate, or attacks index is found by means of the difference between the original series, and the exponential of the permanent per capita component ($L\hom_t^{PC}$)[3], and is shown on figure 5 along with the permanent component of murder for the State. The attacks index matches the qualitative description of known waves of organized crime, internal tensions, crime legislation, social, and political unrest overseas, and presents the cycles of violence in the State as affected by major attacks across the union, and the terrorist attack on the Afred P. Murrah Federal building. To compare this historical narrative of events with my estimates for cyclical terrorist murder and, attacks I use chronologies, and description of facts taken from Clark (1970), Durham (1996), Blumstein and Wallman (2000), Bernard (2002), Dosal (2002), Hewitt (2005), Monkkonen (2001), Wikepedia, the Military Museum, and Henrreta et al. (2006).

Figure 5. Terrorist murder and attacks index for Oklahoma State from 1962 to 2005

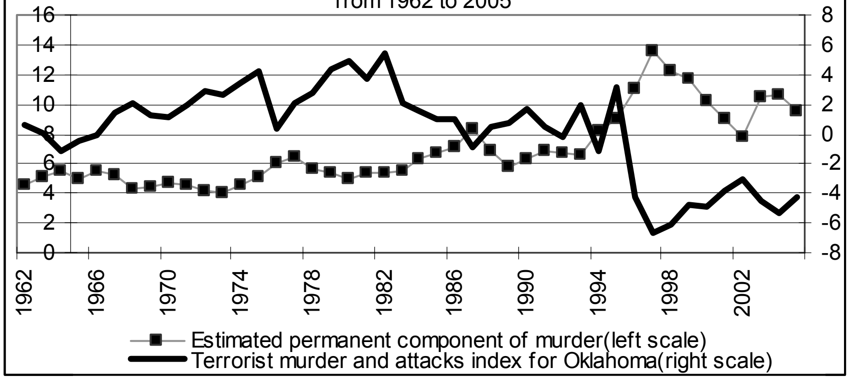
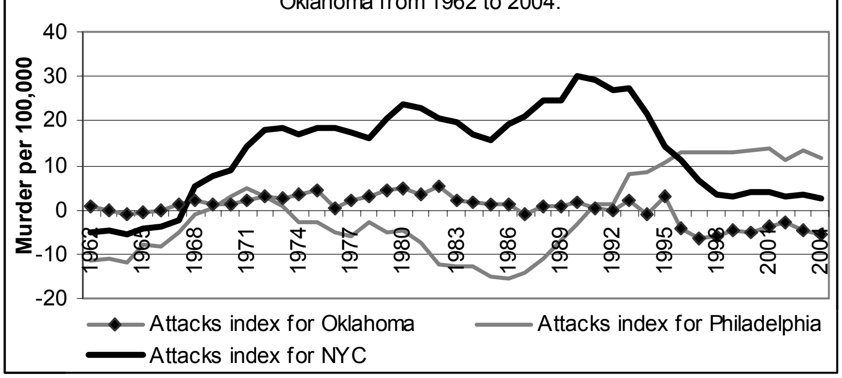


Figure 6 for informational purposes presents the attacks indices for New York City, Philadelphia, and Oklahoma, from 1962 to 2004.

Figure 6. Attacks indices for New York City, Philaldelphia, and Oklahoma from 1962 to 2004.



[3] Turning the estimated permanent per capita component into the level of the permanent component.

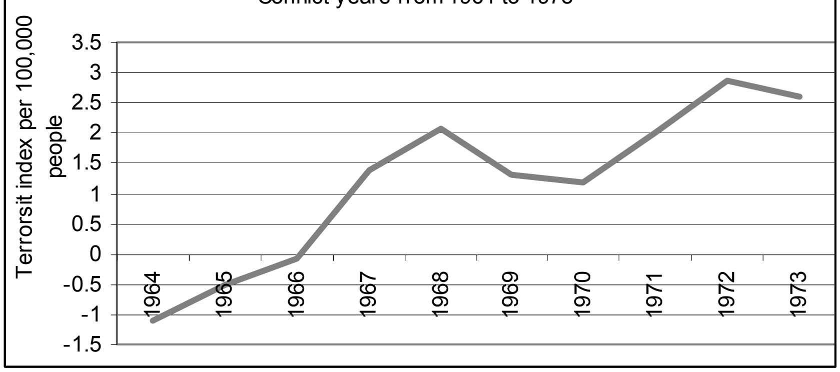
3. Interpretation of results.

I have been able split the per capita series for Oklahoma State finding both, its terrorist attacks index, and its permanent component of murder. The attacks indicator presents as a whole 6 main cycles.

Descending cycle 1962–1966.

The assassination of President John F. Kennedy in 1963 did not affect this index which moved from 1962 to 1963 from 0.56 to 0.03 (-94%); the entrance to the Vietnam Conflict however fueled this index moving from -1.11 in 1964 to 2.59 by the end of this conflict in 1973. (Figure 7).

Figure 7. The attacks index for Oklahoma State during the Vietnam Conflict years from 1964 to 1973



For the shut down in power in New York City, and Los Angeles riots, both occurring in 1965, this index jumped from -1.11 to -0.51 (117%).

Ascending period 1967-1975. This period is characterized by the assassination of Dr. Martin Luther King Jr., which jumped the index from 1.38 in 1967 to 2.06 in 1968 (49.23%), and the ending up of Vietnam Conflict in 1973 which caused a reduction that year by moving from 2.86 in 1972 to 2.59 in 1973 (-9.45); for subsequent years the index continued its ascension as noted for most of the U.S states; 3.48 in 1974, and 4.28 in 1975.

Second ascending period 1976-1982. The period begins with an index of 0.34 in 1976, ending up with 5.46 in 1982.

Descending period 1983-1992. The period begins with an attacks indicator of 2.04 in 1983, ending up with -0.22 in 1992. A period characterized by the end of the war on drugs in Colombia 1985-1992. In 1992 the U.S. with cooperation of Colombian authorities Kill Pablo Escobar, this year additionally the U.S. experience military operations in Los Angeles, and as well the FBI successfully prosecutes New York's Gambino family crime boss John Gotti on 13 charges of murder, gambling, racketeering, and tax fraud. The attacks index for Oklahoma diminishes from 1991 to 1992 from 0.41 to -0.22.

Brief ascending period 1993 – 1995. The index moved up again with precision for the World Trade Center bombing in 1993, moving from -0.22 in 1992 to 1.91 in 1993; and, as well jumped one more time for indicating the bombing of the Alfred P. Murrah Federal building occurred in 1995; accordingly this index jumped from -1.20 in 1994 t 3.22 in 1995.

Descending period 1996 - 2005. The attacks indicator jumped amazingly well for 9/11 2001, moving from -4.92 in year 2000 to -3.76 in 2001 (30.8%)

4. Conclusions.

Provided with a data series of per capita murder from 1933 to 2005, I have constructed both the attacks and the permanent murder indices for Oklahoma State. The index appears moving with precision detecting major terrorist attack dates occurred across the nation, and the State. Immediate research should be done, particularly headed towards constructing a model for attacks, and for permanent murder for this State.

Data Source: FBI, Uniform Crime reports, and Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau.

Acknowledgements

I thank the organizers of the Stockholm Criminology Symposium 2007, particularly Dr. Lina Nilsson, and Dr. Lawrence W. Sherman from the Jerry Lee Center of Criminology for extending invitation to present this research. I additionally thank the Federal Bureau of Investigation (FBI), the Bureau of Economic Analysis (BEA) the U.S. Census Bureau, anonymous lecturers around the world, ***REUTERS,*** United Kingdom and Reuters - Lipper U.S, as well as University of Pennsylvania Department of Economics.

Appendix A. The Beveridge & Nelson decomposition of economic time series applied to decomposing the Oklahoma State per capita homicides from 1933 to 2005.

I denote the observations of a stationary series of the logarithm of per capita homicides for Oklahoma State. by *Lthom* and its first differences by W_t. Following Beveridge & Nelson, BN for short, (1981, p.154), many economic times series require transformation to natural logs before the first differences exhibit stationarity, so the W_t's, then are continuous rates of change.

$$W_t = Lt\,\mathrm{hom}_t - Lt\,\mathrm{hom}_{t-1} \tag{1}$$

If the w's are stationary in the sense of fluctuating around a zero mean with stable autocovariance structure, then the decomposition theorem due to Wold (1938) implies that W_t maybe expressed as

$$W_t = \mu + \lambda_0 \varepsilon_t + \lambda_1 \varepsilon_{t-1} + \ldots, \quad where\ \lambda_0 \equiv 1 \tag{2}$$

Where, μ the $\lambda's$ are constants, and the $\varepsilon's$ are uncorrelated disturbances. According to BN, the expectation of $Lt\,\mathrm{hom}_{t+k}$ conditional on data for $Lt\,\mathrm{hom}$ through time t is denoted by $Lt\,\hat{\mathrm{hom}}(k)$, and is given by

$$\begin{aligned} Lt\,\hat{\mathrm{hom}}(k) &= E(Lt\,\mathrm{hom}_{t+k} \mid \ldots\ldots, Lt\,\mathrm{hom}_{t-1}, Lt\,\mathrm{hom}_t) \\ &= Lt\,\mathrm{hom}_t + E(W_{t+1} + \ldots W_{t+k} \mid \ldots, W_{t+1}, W_t) \\ &= Lt\,\mathrm{hom} + \hat{W}_t(1) + \ldots + \hat{W}_t(k) \end{aligned} \tag{3}$$

Since the $Z_t's$ can be expressed as accumulations of the $W_t's$. Now from (2) it is easy to see that the forecasts of W_{t+i} at time t are

$$\begin{aligned} \hat{W}_t(i) &= \mu + \lambda_i \varepsilon_t + \lambda_{i+1} \varepsilon_{t-1} + \ldots \\ &\mu + \sum_{j=1}^{\infty} \lambda_j\ \varepsilon_{t+1-j}\ , \end{aligned} \tag{4}$$

Now substituting (4) in (3), and gathering terms in each ε_t, I get

$$L\hat{\hom}_t(k) = L\hom_t + \hat{W}_t(i) \tag{5}$$
$$= L\hom_t + \left[\mu + \sum_{j=1}^{\infty}\lambda_j \varepsilon_{t+1-j}\right]$$
$$= k\mu + L\hom_t + \left(\sum_{1}^{k}\lambda_i\right)\varepsilon_t + \left(\sum_{2}^{k+1}\lambda_i\right)\varepsilon_{t-1} + \ldots.$$

And considering long forecasts, I approximately have

$$L\hat{\hom}_t(k) \cong k\mu + L\hom_t + \left(\sum_{1}^{\infty}\lambda_i\right)\varepsilon_t + \left(\sum_{2}^{\infty}\lambda_i\right)\varepsilon_{t-1} + \ldots.. \tag{6}$$

According to (6), it is clearly seen that the forecasts of homicide in period (k) is asymptotic to a linear function with slope equal to μ (constant), and a level $L\hom_t$ (intercept or first value of the series).

Denoting this level by $\overline{L\hom_t}$, I have

$$\overline{L\hom_t} = L\hom_t + \left(\sum_{1}^{\infty}\lambda_i\right)\varepsilon_t + \left(\sum_{2}^{\infty}\lambda_i\right)\varepsilon_{t-1} + \ldots\ldots. \tag{.7}$$

The unknown μ and $\lambda's$ in Eq. (6) must be estimated. Beveridge and Nelson suggest and ARIMA procedure of order (p,1,q) with drift μ.

$$W_t = \mu + \frac{\left(1-\theta_1 L^1 - \ldots - \theta_q L^q\right)}{\left(1-\varphi_1 L^1 - \ldots - \phi_p L^p\right)}\varepsilon_t = \mu + \frac{\theta(L)}{\varphi(L)}\varepsilon_t \tag{8}$$

Cuddington and Winters (1987, p.22, Eq. 7) realized that in the steady state, i.e., L=1, Eq. (9) converts to

$$\overline{L\hom_t} - \overline{L\hom_{t-1}} = \mu + \frac{(1-\theta_1 - \ldots \theta_q)}{(1-\phi_1 - \ldots \varphi_p)}\varepsilon_t = \mu + \frac{\theta(1)}{\varphi(1)}\varepsilon_t \tag{9}$$

The next step requires replacing the parameters of the ARIMA model (Table 3A) and iterating Eq.(9) recursively, i.e., replace t by (t-1), and (t-1) by (t-2), etc, I get

$$W_t = \overline{L\hom_t} - \overline{L\hom_{t-1}} = \mu + \frac{\theta(1)}{\phi(1)}\varepsilon_t \tag{10}$$

$$W_{t-1} = \overline{L\hom_{t-1}} - \overline{L\hom_{t-2}} = \mu + \frac{\theta(1)}{\phi(1)}\varepsilon_{t-1}$$

$$\vdots$$

$$W_1 = \overline{L\hom_1} = \overline{L\hom_0} + \mu + \frac{\theta(1)}{\phi(1)}\varepsilon_1 \quad (\textit{this is the value for year } 1962)$$

$$\vdots$$

$$W_{44} = \overline{L\hom_{59}} = \overline{L\hom_0} + \mu + \frac{\theta(1)}{\phi(1)}\varepsilon_{44} \quad (\textit{this is the value for year } 2005)$$

Adding these equations I obtain W_1 (the value for year 1962), and W44 (the value for year 2005), on the right hand side μ is added "t" times, and the fraction following μ is a constant multiplied by the sum of error terms. I obtain

$$\overline{L\hom_t} = \overline{L\hom_0} + \mu.t + \frac{\theta(1)}{\phi(1)}\sum_{i=1}^{t}\varepsilon_i \tag{11}$$

This is, Newbold's (1990, 457, Eq.(6), which is a difference equation that solves after replacing the initial value for $\overline{L\hom_0}$, which is the logarithm of per capita murder in year 1962.

Cárdenas (1991), suggests that Eq.(11), should be changed when the ARIMA model includes autoregressive components. Since the ARIMA developed for Oklahoma (Table 3A), includes autoregressive, and moving average components, I formally show this now.

$$L\hom_t - L\hom_{t-1} = \mu + \sum_{i=1}^{p}\phi_i W_{t-i} + \sum_{j=1}^{q}\theta_j\varepsilon_{t-j} + \varepsilon_t \tag{12}$$
$$\Delta L\hom_t = W_t = Lt\hom_t - Lt\hom_{t-1}$$

$$L\hom_t - L\hom_{t-1} = \mu + \sum_{i=1}^{p}\phi_i \Delta L\hom_{t-i} + \sum_{j=1}^{q}\theta_j\varepsilon_{t-j} + \varepsilon_t$$

Bringing the moving average components to the LHS, I get

$$L\hom_t - L\hom_{t-1} - \left(\sum_{i=1}^{p}\phi_i \Delta L\hom_{t-1}\right) = \mu + \sum_{i=1}^{q}\theta_j\varepsilon_{t-j} + \varepsilon_t \tag{13}$$

Expanding summation terms

$$(1-\phi_1 L^1 - \phi_2 L^2 - . \, . - \phi_p L^p)(L\,\text{hom}_t - L\,\text{hom}_{t-1}) = \mu + (1+\theta_1 L^1 + . \, . + \theta_q L^q)\varepsilon_t \quad (14)$$

Rearranging Eq. (14) and including the ARIMA parameters from Table 3A, I get.

$$L\text{hom}_t - L\text{hom}_{t-1} = \frac{0.007}{1+0.39+0.69+0.16-0.17} + \left(\frac{1+1.23-1.79-1.46+1.25-1.05-1.43}{1+0.39+0.69+0.16-0.17}\right)\varepsilon_t \quad (15)$$

Now, after recursively replacing, t with (t-1), and (t-1) with (t-2), etc, and after adding together "t" times, I have

$$L\text{hom}_t - L\text{hom}_0 = \frac{0.007\,t}{1+0.39+0.69+0.16-0.17} + \left(\frac{1+1.23-1.79-1.46+1.25-1.05-1.43}{1+0.39+0.69+0.16-0.17}\right)\sum_{i=1}^{t}\varepsilon_i \quad (16)$$

And rearranging,

$$L\text{hom}_t = L\text{hom}_0 + \frac{0.007\ t}{1+0.39+0.69+0.16-0.17} + \left(\frac{1+1.23-1.79-1.46+1.25-1.05-1.43}{1+0.39+0.69+0.16-0.17}\right)\sum_{i=1}^{t}\varepsilon_i \quad (17)$$

In the steady state, when L=1, Eq. (17) yields the permanent component of the per capita murder for Oklahoma, the last step requires taking the exponential to the LHS of Eq. 17, getting the level for the permanent component. The cyclical component is finally obtained by the difference of the level of the observed per capita murder minus the level of the permanent component. Both permanent and cyclical estimated components are shown on figure 5.

Appendix B : data table

	Original Data		**BEVERIDGE - NELSON** Terrorist murder and attacks index	
year	Murder	Murder per capita	Cyclical - component	Permanent component
1933		10.50		
1934		11.60		
1935		7.90		
1936		10.00		
1937		8.10		
1938		8.20		
1939		5.90		
1940		8.20		
1941		6.15		
1942		5.70		
1943		6.64		
1944		6.02		
1945		8.43		
1946		6.80		
1947		8.39		
1948		6.10		
1949		5.54		
1950		3.76		
1951		5.73		
1952		5.69		
1953		5.60		
1954		5.40		
1955		5.20		
1956		4.20		
1957		3.60		
1958		6.60		
1959		6.70		
1960	174	7.47		
1961	119	5.04		
1962	126	5.15	0.5623	4.5848
1963	129	5.19	0.0352	5.1518
1964	110	4.46	-1.1134	5.5759
1965	110	4.43	-0.5118	4.9437
1966	135	5.49	-0.0660	5.5582
1967	166	6.65	1.3870	5.2663
1968	162	6.43	2.0662	4.3675
1969	148	5.76	1.3119	4.4513
1970	151	5.90	1.1924	4.7077
1971	170	6.51	1.9993	4.5142
1972	184	6.99	2.8675	4.1180
1973	177	6.65	2.5970	4.0497
1974	220	8.12	3.4898	4.6312
1975	256	9.44	4.2841	5.1555
1976	178	6.44	0.3469	6.0884
1977	241	8.57	2.0861	6.4873
1978	244	8.47	2.7863	5.6859
1979	281	9.72	4.3401	5.3764
1980	299	9.96	4.9368	5.0257
1981	279	9.01	3.6437	5.3621

1982	344	10.83	5.4636	5.3642
1983	249	7.55	2.0492	5.5009
1984	258	7.82	1.5650	6.2579
1985	254	7.69	1.0340	6.6607
1986	269	8.14	1.0280	7.1112
1987	244	7.46	-0.9129	8.3701
1988	243	7.45	0.5331	6.9141
1989	210	6.51	0.6766	5.8371
1990	253	8.04	1.7140	6.3290
1991	230	7.24	0.4183	6.8258
1992	210	6.54	-0.2243	6.7623
1993	273	8.45	1.9165	6.5329
1994	226	6.94	-1.2006	8.1374
1995	400	12.20	**3.2233**	8.9792
1996	223	6.76	-4.2174	10.9729
1997	229	6.90	-6.6851	13.5889
1998	204	6.10	-6.1575	12.2525
1999	231	6.88	-4.8361	11.7151
2000	182	5.27	-4.9238	10.1981
2001	185	5.30	-3.7679	9.0679
2002	163	4.70	-3.0376	7.7376
2003	206	5.90	-4.5396	10.4396
2004	186	5.30	-5.3408	10.6408
2005	187	5.30	-4.2703	9.5703
2006	207	5.78		

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